

## **METHODS AND SYSTEMS FOR MAGNETIC COUPLING OF LATCH MECHANISMS**

### **TECHNICAL FIELD**

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[001] Embodiments are generally related to door latch assemblies, including door latching mechanisms utilized in automobiles and other vehicles. Embodiments are also related to magnetic coupling techniques and devices.

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### **BACKGROUND OF THE INVENTION**

[002] Latching mechanisms are utilized in a variety of commercial and industrial applications, such as automobiles, airplanes, trucks, and the like. For example, an automotive closure, such as a door for an automobile passenger compartment, is typically hinged to swing between open and closed positions and conventionally includes a door latch that is housed between inner and outer panels of the door. The door latch functions in a well-known manner to latch the door when it is closed and to lock the door in the closed position or to unlock and unlatch the door so that the door can be opened manually.

[003] The door latch can be operated remotely from inside the passenger compartment by two distinct operators – a button or an electric switch that controls the locking function and a handle that controls the latching function. The door latch is also operated remotely from the exterior of the automobile by a handle or push button that controls the latching function. A second distinct exterior operator, such as a key lock cylinder, may also be provided to control the locking function, particularly in the case of a front vehicle door. Each operator is accessible outside the door structure and extends into the door structure where it is operatively connected to the door latch mechanism by a cable actuator assembly or linkage system located inside the door structure.

[004] Vehicles, such as passenger cars, are therefore commonly

equipped with individual door latch assemblies which secure respective passenger and driver side doors to the vehicle. Each door latch assembly is typically provided with manual release mechanisms or lever for unlatching the door latch from the inside and outside of the vehicle, e.g. respective inner  
5 and outer door handles. In addition, many vehicles also include an electrically controlled actuator for remotely locking and unlocking the door latches.

[005] One of the problems inherent with conventional latching  
10 mechanisms is that it is difficult, but necessary, to seal an area of a vehicle door latch through which motion must pass to an unsealed area. Motion must be coupled in the sealed area to achieve motion in the unsealed area and vice versa. Conventional latching assemblies do not provide stability and efficiency in achieving such motion. It therefore believed that a need  
15 exists for improved methods and systems for achieving motion within a latching mechanism without the instability and inefficiency inherent with conventional latching devices.

## BRIEF SUMMARY OF THE INVENTION

[006] The following summary of the invention is provided to facilitate  
5 an understanding of some of the innovative features unique to the present  
invention and is not intended to be a full description. A full appreciation of  
the various aspects of the invention can be gained by taking the entire  
specification, claims, drawings, and abstract as a whole.

10 [007] It is, therefore, one aspect of the present invention to provide  
for an improved latch mechanism.

[008] It is another aspect of the present invention to provide for  
improved latching methods and systems for use in automobiles and other  
15 vehicles.

[009] It is yet a further aspect of the present invention to provide for  
magnetic coupling of motion between sealed and unsealed areas in a vehicle  
door latch environment.

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[0010] The aforementioned aspects of the invention and other  
objectives and advantages can now be achieved as described herein.  
Latching systems and methods are disclosed herein. A latch mechanism  
includes one or more sealed areas and one or more unsealed areas thereof.  
25 Also, a magnetic coupling mechanism is provided for coupling motion  
between the sealed area and the unsealed area and vice versa. The  
magnetic coupling mechanism can be configured to include a permanent  
magnet which generates a magnetic field for coupling the motion from the  
unsealed area to the sealed area and vice versa. The magnetic coupling  
30 mechanism can also be configured to include an electromagnet for  
generating a magnetic field for coupling thereof.

## BRIEF DESCRIPTION OF THE DRAWINGS

5 [0011] The accompanying figures, in which like reference numerals refer to identical or functionally-similar elements throughout the separate views and which are incorporated in and form a part of the specification, further illustrate the present invention and, together with the detailed description of the invention, serve to explain the principles of the present invention.

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[0012] FIG. 1 illustrates a perspective view of a vehicle door mounted to a passenger vehicle in which a preferred embodiment of the present invention can be implemented; and

15 [0013] FIG. 2 illustrates a high-level block diagram of a system which can be implemented in accordance with a preferred embodiment of the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

[0014] The particular values and configurations discussed in these  
5 non-limiting examples can be varied and are cited merely to illustrate at  
least one embodiment of the present invention and are not intended to limit  
the scope of the invention.

[0015] FIG. 1 illustrates a perspective view of a vehicle door 12  
10 mounted to a passenger vehicle in which a preferred embodiment of the  
present invention can be implemented. A vehicle, such as an automobile  
can be equipped with one or more individual door latch assemblies 10, which  
secure respective passenger and driver side doors to the vehicle 14. Each  
door latch assembly 10 is typically provided with manual release  
15 mechanisms or lever for unlatching the door latch from the inside and  
outside of the vehicle, e.g. respective inner and outer door handles.

[0016] In addition, many vehicles can also be equipped with  
electrically controlled actuators for remotely locking and unlocking the door  
20 latches. As indicated in FIG. 1, a door latch assembly 10 can be mounted to  
a driver's side vehicle door 12 of a passenger vehicle 14. The door latch  
assembly 10 may be mounted to front and rear passenger side doors thereof  
and may be incorporated into a sliding side door, rear door, a rear hatch or a  
lift gate thereof, depending upon design constraints.

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[0017] FIG. 2 illustrates a high-level block diagram of a system 200,  
which can be implemented in accordance with a preferred embodiment of  
the present invention. System 200 generally includes a latch mechanism  
210 having at least one sealed area 204 and at least one unsealed area 206  
30 thereof. System 210 also includes a magnetic coupling mechanism 202 for  
coupling motion between said sealed area 204 and unsealed area 206 and  
vice versa. Magnetic coupling mechanism 202 can be configured to include

a magnet 208, which can be implemented as a permanent magnet or an electromagnetic to generate respective permanent or electromagnetic fields to couple motion in sealed area 204 to achieve motion in unsealed area 206 and vice versa.

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[0018] System 200 thus permits sealing of a vehicle door latch, such as the door latch assembly 10 depicted in FIG. 1 through which motion must pass to an unsealed area thereof. It can be appreciated that coupling mechanism 202 can be configured to comprise one or more shafts (i.e., a single shaft or a plurality of shafts) coupled to the magnetic coupling mechanism for engaging sealed area 204 with the unsealed area 206. Such shafts can be integrated with the coupling mechanism 202. System 200 can be implemented in the context of latch assembly 10 of FIG. 1. For example, latch mechanism 210 of system 200 can be implemented as an assembly similar to latch assembly 10 of FIG. 1, but which includes one or more sealed areas 204 and one or more unsealed areas 206.

[0019] The embodiments and examples set forth herein are presented to best explain the present invention and its practical application and to thereby enable those skilled in the art to make and utilize the invention. Those skilled in the art, however, will recognize that the foregoing description and examples have been presented for the purpose of illustration and example only. Other variations and modifications of the present invention will be apparent to those of skill in the art, and it is the intent of the appended claims that such variations and modifications be covered.

[0020] The description as set forth is not intended to be exhaustive or to limit the scope of the invention. Many modifications and variations are possible in light of the above teaching without departing from the scope of the following claims. It is contemplated that the use of the present invention can involve components having different characteristics. It is intended that the scope of the present invention be defined by the claims appended hereto,

giving full cognizance to equivalents in all respects.